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China’s decision to reduce its carbon dioxide emissions should help to alleviate the dangerously high levels of air pollution in the country.

CLIMATE CHANGE

China gets tough on carbon

Cap-and-trade pilot schemes set stage for nationwide roll-out.

BY JANE QIU

China, responsible for about one-quarter of the world’s carbon dioxide emissions, has ambitious goals to reduce them — but has been unwilling to set absolute targets for fear of slowing economic growth. There are now signs that its position is changing.

On 18 June, the country will launch an emissions-trading scheme in the southern city of Shenzhen, marking its first attempt to cut emissions using market mechanisms. Under the scheme, more than 630 industrial and construction companies will be given quotas for how much carbon dioxide they can emit. Companies that pollute more than they are allowed will have to buy credits from cleaner counterparts that reduce emissions below their quota — thereby creating a price for the greenhouse gas.

Another six such cap-and-trade schemes will

be rolled out by the end of the year in the cities of Beijing, Tianjin, Shanghai and Chongqing, and the provinces of Guangdong and Hubei. The trial will cover 864 million tonnes of carbon dioxide by 2015 — around 7% of China’s total emissions and about the total amount emitted by Germany each year, according to a report by the London-based analyst firm Bloomberg New Energy Finance. These regional pilot schemes will set the stage for the nationwide carbon market that is scheduled to launch in 2016.

China has committed to cutting its carbon intensity — carbon emissions per unit of gross domestic product — by 40–45% of 2005 levels by 2020, which allows for increases in emissions, although at a slower rate. The initial emissions limits for the regional schemes will be set by

applying the carbon-intensity targets to the emissions of individual companies. In 2016, this system will be scaled up nationally, again in line with carbon-intensity targets.

After 2020, this plan is likely to be replaced with an absolute cap that would require a decline in overall emissions covered under the scheme. Such a move will depend on the effectiveness of an array of planned energy policies, researchers say. “It’s not difficult from a technical point of view,” says Xiang Gao, a member of China’s climate-talks delegation and a researcher at China’s National Development and Reform Committee (NDRC), the powerful ministry responsible for planning the country’s economic and social development. “It’s a matter of political will — which, in turn, will depend on whether the top leadership can be convinced that such a move is best for the country’s economy and social stability,” Gao says. ▶

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For more on China’s emissions and pollution, see: go.nature.com/clpsie

► Researchers say that China has reasons beyond climate change to implement emission caps. In the past few years, rampant air pollution has caused increased public resentment and social unrest across the country. “China may not have a choice any more,” says Knut Alfsen, head of research at the Centre for International Climate and Environmental Research in Oslo. “It’s just much better to control total emissions.”

A commitment from China to cap emissions “would breathe new life into climate talks”, adds Alfsen, who is also a member of the China Council for International Cooperation on Environment and Development, an international think tank that works closely with China’s cabinet and the NDRC. At the next climate-change summit, in Paris in 2015, nearly 200 countries will aim to reach a legally binding global agreement on emissions cuts, which would take effect in 2020. Kelly Sims Gallagher, an expert on energy and environmental policy at Tufts University in Medford, Massachusetts, says that an ambitious emissions cap from China “would send a strong political signal to the world” and would make it easier to

pass more aggressive climate legislation in the United States, where there is strong political resistance to national climate regulations.

Most researchers contacted by *Nature* are only cautiously optimistic that China can cap its emissions. A carbon ceiling for China “depends in part on how successful the pilot schemes will be”, says Lei Ming, an environmental economist

“The energy market in China is not entirely free and has a lot of government interference and monopoly.”

at Peking University in Beijing. “We will have to cross the river by feeling the stones,” he says, citing the famous one-liner by the late reformist leader Deng Xiaoping. One of the main challenges for the nationwide cap-and-trade scheme will be establishing its credibility. Verifying emissions, for instance, will be difficult in such a large country, says Gallagher. David Yuetan Tang, board secretary of the Tianjin Climate Exchange, which is in charge of one of the seven pilot emission-trading schemes, says that there is an institutional void about who will do this — and also a legal

void about how companies will be punished for fraudulent claims or emissions excesses. “This is absolutely paramount, because emission quotas are money,” he adds.

Moreover, whether emissions trading can work under China’s political system remains to be seen, critics say. “The energy market in China is not entirely free and has a lot of government interference and monopoly,” says Qi Ye, an environmental-policy researcher at Tsinghua University and director of the Beijing office of the international think tank Climate Policy Initiative. The price of electricity, for instance, is heavily controlled, he says, which could seriously diminish the impact of imposing a carbon price on electricity producers.

Emissions trading is just one of a series of energy and pollution policies due to be introduced in the next few years. For instance, Beijing is considering implementing a carbon tax to rein in pollution by sectors not covered by cap and trade, and continues to invest aggressively in renewable energy. It has also pledged to reduce the production and use of hydrofluorocarbons, powerful greenhouse gases used in refrigeration and air conditioning. ■

PERSONALIZED MEDICINE

‘Master protocol’ aims to revamp cancer trials

Pilot project will bring drug companies together to test targeted lung-cancer therapies.

BY HEIDI LEDFORD

In the push to match medical therapies to the genetic underpinnings of disease, lung-cancer treatments have been at the frontier. But the 1.6 million people diagnosed with this cancer every year will take scant comfort in knowing that of the past 20 late-stage trials of drugs to treat it, only two yielded positive results. And in only one of those 20 were patients chosen systematically by screening for biomarkers such as relevant blood proteins or DNA sequences.

Now, an ambitious project aims to improve those success rates and speed new treatments to market by matching companies with the patients whose tumours are most genetically relevant to the therapies they are trying to develop. The project is slated to launch next year and, if successful, could be expanded to other cancers.

The project was spearheaded by the Friends of Cancer Research, a think tank and advocacy group in Washington DC, and has won the support of the US National Cancer Institute and the US Food and Drug Administration (FDA). The

idea is to streamline the drug-approval process by bringing pharmaceutical companies together to test multiple experimental drugs in late-stage clinical trials under a single, ‘master’ protocol. “The drive is to make the whole process of personalized medicine more efficient,” says Eric Rubin, vice-president of oncology clinical research at Merck, a pharmaceutical firm based in Whitehouse Station, New Jersey.

PLUG AND PLAY

Launching a large, late-stage clinical trial typically takes more than two years and requires some three dozen administrative and regulatory approvals. To simplify this tangle, the master protocol will create an experimental plan to test several candidate drugs in hundreds of clinics across the United States. The initial protocol is expected to include up to six drugs; others may be added later, without the need for fresh protocol approval each time. “It’s like a Plug and Play,” says David Gandara, an oncologist at the University of California, Davis, who is in charge of drafting the plan. “So you don’t waste time over and over.”

Gandara has advocated this approach for the past decade, but the FDA and the pharmaceutical industry voiced support only recently — swayed by a growing body of data revealing that cancers are, in effect, many rare diseases with different genetic roots (see *Nature* 455, 148; 2008). A genetically targeted drug may work, but only in a fraction of cases. Such rare effects could easily be overlooked in a trial that contains a mix of patients whose cancers have heterogeneous causes, and the costs for drug companies to sort them all and run scores of separate trials are prohibitive.

Under the master protocol, by contrast, patients will be screened for various biomarkers and assigned to trials for drugs that are most likely to be effective. The approach does away with the need for patients to undergo multiple screenings: participating companies could enrol them from a large, central pool. It also eases pressure on the (often minute) tissue samples taken during lung biopsies, because many tests can be done at the same time, says Rubin.

A similar model is already being tested in two smaller clinical trials for breast and lung